REMARKS

Entry of the foregoing, re-examination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. § 1.111, and in light of the remarks which follow, are respectfully requested.

The specification has been amended at page 4, to correct a typographical error, by replacing "aforementioed" with --aforementioned--.

Claims 4 and 7 have been amended to further improve their form, which do not narrow the scope of the claims.

Upon entry of the Amendment, claims 1-7 will be all the claims pending in the application.

I.   Response to Objection to the Specification

The specification was objected to for the informality set forth in paragraph 1 of the Office Action.

As noted above, Applicants have amended the specification to correct the misspelling of "aforementioned." Accordingly, the Examiner is respectfully requested to reconsider and withdraw the objection.

II.   Comments on the Presently Claimed Invention

Applicants wish to provide the following additional comments regarding the presently claimed invention.

The fine silica particles of the presently claimed invention can be produced by reacting a starting silicon compound in the flame and, particularly, can be produced by partly

melt-adhering the silica particles formed in the flame while adjusting the aggregation of the particles (*see* paragraph bridging pages 9 and 10 of the present specification).

Specifically, as shown in the diagram below, a burner (nozzle) of the double tubular structure is used and an inflammable gas (hydrogen or hydrocarbon) and oxygen (combustion support gas) are fed into the tube on the outer side, to thereby form an outer circumferential flame. At the same time, the gas of a silicon compound, which is the starting material, is fed into the central tube, so that the reaction takes place in the outer circumferential flame (*see* page 10, 1st paragraph, of the present specification).
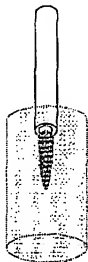
That is, in reacting the starting silicon compound in the flame as described above, flow velocity (average flow velocity) of gases at the outlet of the burner and the concentration of the starting silicon compound in the flame are adjusted to lie within predetermined ranges, and the temperature of the outer circumferential flame is adjusted to partly melt-adhere the formed particles. If the concentration of the starting silicon compound is increased, the average particle size of the resulting silica particles increases, the specific surface area decreases, and the fractal shape parameter increases. In addition, if the velocity

at the outlet of the burner is increased, the average particle size of the resulting silica particles decreases, the specific surface area increases, and the fractal shape parameter decreases. Furthermore, if the temperature of the outer circumferential flame is increased, the average particle size increases, the specific surface area decreases, and the fractal shape parameter increases (*see* page 10, line 14 to page 11, line 10 of the present specification).

By applying the above-mentioned techniques, it can be produced the presently claimed fine silica particles having fractal shape parameters satisfying the conditions specified by the formulas (1) and (2) recited in the present claims.

Regarding the effect of the oxygen ratios, when the outer circumferential flame is formed by feeding oxygen (combustion support gas) as described above, it is a known fact among people skilled in the art that the amount of oxygen affects the temperature of the outer circumferential flame. In addition, the effect of the temperature of the outer circumferential flame on the properties of the silica particles has been clearly described in the present specification. Moreover, Examples of the present specification clearly describe the oxygen ratio, concentration of the starting silicon compound, average flow velocity of gases and amounts of hydrogen.

III. **Response to Rejection under 35 U.S.C. § 112, First Paragraph**

Claims 1-7 were rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth in paragraph 4 of the Office Action.

Applicants respectfully traverse the rejection for the following reasons.

It was asserted that "the specification fails to define the ratio of the oxygen" and "[i]t is not defined whether the oxygen ratio as reported in Table 1 and Table 4 is a ratio of oxygen of what component to what component" (paragraph 4.1 of the Office Action).

Applicants respectfully submit that the concept of "oxygen ratio" is commonly accepted terminology and well known in the art of combustion. Specifically, oxygen ratios as used in Tables 1 and 4 of the present specification, represent the amounts of oxygen used for the combination. Specifically, the amounts of oxygen are represented by ratios to the amounts of oxygen required for completely burning the silicon compound used as the starting material and hydrogen used as the combustible gas. In this regard, for example, U.S. Patent No. 6,063,354 to Mangold et al., which is relied upon by the Examiner in the § 102 rejection discussed below, describes the amount of oxygen used in the combustion by an oxygen ratio (oxygen ratio lambda).

In the present specification, when octamethylcyclotetrasiloxane $[(CH_3)_2SiO]_4$ is used as the starting silicon compound, for example, the combustion formula thereof can be expressed below:

$$[(CH_3)_2SiO]_4 + 16O_2 \rightarrow 4SiO_2 + 8CO_2 + 12H_2O$$
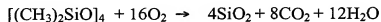
On the other hand, the combustion formula for hydrogen is as follows:

$$2H_2 + O_2 \rightarrow 2H_2O$$
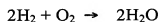
In Example 1 of the present specification, for instance, one mole of the silicon compound and 160 moles of hydrogen are fed and, besides, the oxygen ratio is 1.0. That is, the amount of oxygen used is:

$$[16+(160/2)] \times 1.0 = 96 \text{ moles}$$

In this Example 1, therefore, the total amount of gases fed to the reaction can be expressed by mole and by volume, as given below (the volume of one mole of gas under the normal state is 0.0224 m^3).

$$1 + 160 + 96 = 257 \text{ moles}$$

$$257 \times 0.0224 = 5.76 \text{ m}^3$$

The combustion is sustained by feeding the gases in the above amounts, respectively, and as a result, 4 moles of silica are formed. In Example 1, therefore, the concentration of the starting silicon compound in the flame (i.e., silica concentration in the flame) calculated as SiO_2 is:

$$4/5.76 = 0.69 \text{ mole/m}^3$$

In a similar manner, the amounts of oxygen used for the combination and the silica concentrations in the flame can be found concerning Examples 2 to 4. The results are tabulated below:

	Starting silicon compound	H_2	O_2	Total amount of gases		Amount of formed SiO_2	Concentration of silica in flame
	Mol	Mol	Mol	Mol	m^3	Mol	Mol/m^3
Ex. 1	1	160	96.00	257.00	5.76	4	0.69
Ex. 2	1	40	75.60	116.60	2.61	4	1.53
Ex. 3	1	160	153.60	314.60	7.05	4	0.57
Ex. 4	1	160	201.60	362.60	8.12	4	0.49

In view of the foregoing, Applicants respectfully submit that the present specification provides sufficient description of the presently claimed invention, in particular, with respect to the term "oxygen ratio." Accordingly, the Examiner is respectfully requested to reconsider and withdraw the § 112 rejection.

IV.   Response to Rejection under 35 U.S.C. § 102(b)

Claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,063,354 to Mangold et al.

Applicants respectfully traverse this rejection for the following reasons.

The present claims are directed to fine silica particles having an average particle size of 0.05 to 1 μm, wherein in a measurement of small-angle X-ray scattering, a fractal structure parameter α_1 at length scales ranging from 50 nm to 150 nm and a fractal structure parameter α_2 at length scales ranging from 150 nm to 353 nm satisfy the following formulas (1) and (2):

$$-0.0068S + 2.548 \leq \alpha_1 \leq -0.0068S + 3.748 \qquad (1)$$

$$-0.0011S + 1.158 \leq \alpha_2 \leq -0.0011S + 2.058 \qquad (2)$$

wherein S is a BET specific surface area (m^2/g) of the fine silica particles.

When such silica particles having the parameters α_1 and α_2 lying within the predetermined ranges are added in large amounts to a resin, an increase in the viscosity is relatively small.

The Examiner's position appears to be that silica particles described in Mangold et al. have a specific surface area that lies in a range recited in the present claims and are produced by the same method as described in the present specification, and are, therefore, the same as the presently claimed silica particles.

Applicants respectfully submit that the silica particles of Mangold et al. are produced by a method which is obviously different from the method described in the present specification, and as such, the silica particles of Mangold et al. are quite different from the presently claimed silica particles, as explained below.

According to Figs. 1 and 2 of Mangold et al., the starting silicon compound is fed to the center tube of the burner; however, hydrogen gas (inflammable gas) alone is fed to the tube on the outer side of the center tube without oxygen. Oxygen is simply fed from the air in the atmosphere. Concretely speaking, oxygen is not fed together with the inflammable gas from the outer tube.

Therefore, in Mangold et al., the temperature of the outer circumferential flame is relatively low. In this regard, the temperature of the outer circumferential flame in Mangold et al. is about 500°C lower than the temperature of the outer circumferential flame formed by feeding oxygen and hydrogen from the outer tube, as described in the present specification.

Accordingly, in Mangold et al., the particles are not partly melt-adhered in the outer circumferential flame and, hence, the obtained silica particles are a so-called fumed silica having particle shapes which are complex and are far from the truly spherical shape as described in the specification of the present application.

In addition, both the fractal shape parameters α_1 and α_2 expressed by the formulas (1) and (2) of the silica of Mangold et al. are smaller than those of the presently claimed silica particles. Moreover, Mangold et al. does not at all describe the beneficial properties when the presently claimed silica particles are used with a resin.

Further, in Mangold et al., since the temperature of the outer circumferential flame is not elevated to partly melt-adhere the particles formed in the outer circumferential flame, oxygen is fed in an amount smaller than that described in the present specification. Specifically, as shown in Examples of the present specification, the oxygen ratio is not smaller than 1.0. In contrast, in Mangold et al., the oxygen ratio (i.e., oxygen ratio lambda) is 0.7 to 0.9.

In view of the foregoing, Applicants respectfully submit that the process described in Mangold et al. is not the same as that described in the present specification, and that Mangold et al. does not disclose or anticipate the presently claimed fine silica particles. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection.
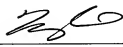
V.   **Conclusion**

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order and such action is earnestly solicited. If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at (202) 452-7932 at his earliest convenience.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: September 26, 2007   By: _____

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